

In re Patent Application Serial No. 09/599,269
Applicant: Rose

FURTHER SUPPLEMENTAL DECLARATION OF ERNEST MAYER

I, Ernest Mayer, hereby declare as follows:

1. I am Senior Consultant at the DuPont PARSAT Center, Wilmington, Delaware, and have been employed by E.I DuPont de Nemours and Co. in that capacity for many years.
2. I received my B.S. and M.S. degrees in chemical engineering from Columbia University in New York City. I received my Ph.D. degree in chemical engineering from the University of Delaware, Newark, Delaware.
3. This declaration is in support of patent application Serial No. 09/599,269 of Rose, entitled "Annular Pleated Filter Cartridge for Liquid Filtration Apparatus," and is for submission by applicant with an amendment filed by Rose on or about August 24, 2004. This declaration further supplements my earlier declarations of March 11, 2004 and November 28, 2001, copies of which are attached.
4. I am well aware of the use of mesh layers in prior annular pleated non-woven filter cartridges. I am also aware that the pending patent application properly refers to such mesh layers in its description of annular pleated non-woven filter cartridges of the *prior art* by stating as follows (at page 2, lines 9-11):

"In some cases, one or more open mesh or net layers are used in pleated structures for spacing, support or flow-facilitating purposes."
5. Mesh layers are joined to the non-woven filter material by tack-point interconnection at randomly-spaced points of contact. With reference to the preferred embodiment of the Rose invention, this is described at page 5, lines 23-28 of the pending patent application as follows:

"[T]he mesh is tack-point interconnected to the filter material Such tack-point interconnections are polyethylene-to-polyethylene bonding at randomly-spaced points of contact of the mesh with the filter material."
6. The random nature of such random tack-point interconnection of mesh layer to the extremely thin TYVEK Soloflo material used in the Rose invention is such that the presence of the mesh does *not* detract from the conclusions given in my declaration of March 11, 2004 (including in paragraphs 10-13 of such declaration) – concerning the thinking of persons of

Ernest Mayer Supplemental Declaration

Page 2 of 3

ordinary skill in the art of annular pleated non-woven filter cartridges — *i.e.*, thinking with respect to the non-obviousness of using TYVEK Soloflo material in such cartridges. Such factual conclusions were made with my knowledge of the presence of such a common mesh layer.

7. The nature of the specific problems of annular pleated non-woven filter cartridges is such that the presence of a mesh layer randomly tack-point interconnected to the non-woven material would in no way assure proper sealing.

8. Key factual observations and conclusions of my most recent declaration are here repeated for emphasis in the following paragraphs:

9. Pleated annular filter cartridges of the type having non-wovens for filtration have particular problems and concerns relating to a difficulty of reliably achieving appropriate sealing of the pleated ends of a pleated non-woven with cartridge endcaps, and is absolutely essential in order to avoid by-pass of the filter. Based on my experience in the art, those skilled in the art of annular pleated non-woven filter cartridges would typically believe that the TYVEK Soloflo non-woven material referred to in the Rose patent application would not reliably achieve the end sealing relationship that is essential for annular pleated filter cartridges, and would thus turn to other thicker, bulkier non-woven materials. Such TYVEK Soloflo material is highly flexible, and to persons of ordinary skill in the art such thin flexible material would not be considered appropriate for annular pleated filter cartridges.

10. The TYVEK Soloflo material of the annular pleated filter cartridge of the Rose patent application is very thin — preferably less than about 0.15 mm thick and most preferably less than or equal to about 0.13 mm thick. Given such thinness and the nature of such material, the use of such fragile material for an annular pleated filter cartridge would be contra-indicated to a person of ordinary skill in the art because such material would not be thought reliably capable of successful lengthwise bonding (TYVEK-to-TYVEK) as necessary for formation of an annular pleated filter cartridge for liquid filter use.

11. Persons of ordinary skill in the art, who are aware of the nature of the problems typically associated with manufacture of annular pleated non-woven filter cartridges and made aware of characteristics of the TYVEK Soloflo material, would not, because of its nature, regard

Ernest Mayer Supplemental Declaration

Page 3 of 3

such material as a material usable in connection with creation of an annular pleated non-woven filter cartridge.

12. Given the low firmness (high flexibility) of such filter material, and the extreme material thinness which exacerbates such flexibility, the ability for such material to be formed successfully into an annular pleated filter cartridge was not and would not have been apparent to a person of ordinary skill in the art.

13. The extreme thinness and nature of the Tyvek material of the claimed annular pleated filter cartridge makes such material so very flimsy and different in nature from the non-woven materials of the prior art that the person of ordinary skill in the art of annular pleated non-woven filter cartridges would not have considered it for this class of products.

14. I affirm all the conclusions and information I have provided in my prior declarations mentioned above.

* * * * *

All statements made herein of my own knowledge are true, and all statements made on information and belief are believed to be true; such statements were made with the knowledge that willful false statements are punishable by fine or imprisonment or both (18 USC §1001) and jeopardize the validity of the application or any patent issued thereon.

Dr. Ernest Mayer 8/25/04
Ernest Mayer, Ph.D.

Dated: August 25, 2004

Declaration Signed March 11, 2004

In re Patent Application Serial No. 09/599,269
Applicant: Rose

SUPPLEMENTAL DECLARATION OF ERNEST MAYER

I, Ernest Mayer, hereby declare as follows:

1. I am Senior Consultant at the DuPont PARSAT Center, Wilmington, Delaware, and have been employed by E.I DuPont de Nemours and Co. in that capacity for many years.
2. I received my B.S. and M.S. degrees in chemical engineering from Columbia University in New York City. I received my Ph.D. degree in chemical engineering from the University of Delaware, Newark, Delaware.
3. This declaration is in support of patent application Serial No. 09/599,269 of Rose, entitled "Annular Pleated Filter Cartridge for Liquid Filtration Apparatus," and is for submission by applicant with a Response filed by Rose on or about March 11, 2004. This declaration supplements my earlier declaration of November 28, 2001, a copy of which is attached.
4. I have read the PTO action of December 11, 2003. In particular, I have seen the Examiner's statements on pages 4 and 16-17 of such action, concerning DuPont's Marshall et al. (WO 905) PCT international publication, asserting that:

[T]he reference (Marshall et al.) is actually disclosing a (different entity from TYVEK) filter sheet material that has strength, weight and barrier properties which is (sic) at least equivalent to that of the TYVEK sold by DuPont, but has a significantly improved air and liquid permeability (see page 2, last paragraph of Marshall et al.), thereby creating a more efficient filter product (therefore, not the same TYVEK material which has been exhaustively discussed in applicant's arguments and talked about by the Declaration by Ernest Mayer from DuPont).

(emphasis added) In short, the Examiner appears to assert that: (1) the Marshall et al. patent document discloses a material *other than* TYVEK sold by DuPont; and (2) the material disclosed in the Marshall et al. patent document is *not* the material talked about in my earlier Declaration.

5. I am aware of and have reviewed the Marshall et al. patent document and note that these assertions by the Examiner in the PTO action are in fact wrong. The material disclosed in Marshall et al. is TYVEK Soloflo sold by DuPont, and it is precisely the material referred to in my Declaration of November 28, 2001 — as the TYVEK used in the unique annular pleated filter cartridges of the Rose patent application.

- copy - for attachment to Mayer's Second Supplemental Declaration -

Ernest Mayer Supplemental Declaration

Page 2 of 3

6. I have read the currently-pending claims of Rose patent application. Until the Rose invention, there were no annular pleated liquid filtration cartridges utilizing a TYVEK material as the filtration medium. Nor would such annular pleated filter cartridges have been obvious to the person of ordinary skill in the art, including for reasons elaborated upon below.

7. I have also read Patent No. 5,528,127 (Gsell et al.). The Gsell et al. patent, like others, discloses a non-woven filter material in an annular pleated filter cartridge. The Gsell et al. material is not a Tyvek, nor is it even a polyethylene; it is a polyethylene terephthalate (PET) or polybutylene terephthalate (PBT). Of greatest significance, however, is that even the thinnest non-woven material contemplated by Gsell et al. is nearly 17 times thicker than the very thickest of the Tyvek material in Rose's claims, which require that the material have "a thickness of less than about 0.15 mm."

8. The extreme thinness and nature of the Tyvek material of the claimed annular pleated filter cartridge makes such material so very flimsy and different in nature from the non-woven material of the Gsell et al. patent that the person of ordinary skill in the art of annular pleated filter cartridges would not have considered it for this class of products.

9. The Gsell et al. patent is an example of pleated non-woven filter cartridges utilizing non-woven filter materials, such as of polypropylene, nylon and various polyesters that are significantly thicker and bulkier than the Tyvek material used in the unique annular pleated filter cartridges of the Rose patent application. Until creation of the present Rose invention there were no annular pleated liquid filtration cartridges utilizing Tyvek, including a Tyvek as described in the Rose claims, as the filtration medium.

10. Pleated annular filter cartridges of the type having non-wovens for filtration have particular problems and concerns relating to a difficulty of reliably achieving appropriate sealing of the pleated ends of a pleated non-woven with cartridge endcaps, as is absolutely essential in order to avoid by-pass of the filter. Based on my experience in the art, those skilled in the art of annular pleated non-woven filter cartridges would typically believe that the Tyvek non-woven material referred to in the Rose patent application would not reliably achieve the end sealing relationship that is essential for annular pleated filter cartridges, and would thus turn to other

- copy -

Ernest Mayer Supplemental Declaration

Page 3 of 3

thicker, bulkier non-woven materials. The Tyvek material is highly flexible, and to persons of ordinary skill in the art such thin flexible Tyvek material would not be considered appropriate for annular pleated filter cartridges.

11. The Tyvek material of the annular pleated filter cartridge of the Rose patent application is very thin -- preferably less than about 0.15 mm thick and most preferably less than or equal to about 0.13 mm thick. Given such thinness and the nature of such material, the use of such fragile material for an annular pleated filter cartridge would be contra-indicated to a person of ordinary skill in the art because such material would not be thought reliably capable of successful lengthwise bonding (Tyvek-to-Tyvek) as necessary for formation of an annular pleated filter cartridge for liquid filter use.

12. Persons of ordinary skill in the art, who are aware of the nature of the problems typically associated with manufacture of annular pleated non-woven filter cartridges and made aware of characteristics of the Tyvek material, would not, because of its nature, regard such Tyvek material as a material usable in connection with creation of an annular pleated non-woven filter cartridge.

13. More specifically, given the low firmness (high flexibility) of such filter material, and the extreme material thinness which exacerbates such flexibility, the ability for such material to be formed successfully into an annular pleated filter cartridge was not and would not have been apparent to a person of ordinary skill in the art.

* * * * *

All statements made herein of my own knowledge are true, and all statements made on information and belief are believed to be true; such statements were made with the knowledge that willful false statements are punishable by fine or imprisonment or both (18 USC 1001) and jeopardize the validity of the application or any patent issued thereon.

Dr. Ernest Mayer 3/11/04
Ernest Mayer, Ph.D.

Dated: March 11, 2004

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Declaration Signed November 28, 2001

Patent Application Serial No. 09/599,269

Applicants: Rose et al.

DECLARATION OF ERNEST MAYER

I, Ernest Mayer, hereby declare as follows:

1. I am Senior Consultant at the DuPont PARSAT Center, Wilmington, Delaware, and have been employed by E.I. DuPont de Nemours and Co. in that capacity for many years.

2. I received my B.S. and M.S. degrees in chemical engineering from Columbia University in New York City. I received my Ph.D. degree in chemical engineering from the University of Delaware, Newark, Delaware.

3. This declaration is in support of patent application Serial No. 09/599,269, of Rose et al., entitled "Annular Pleated Filter Cartridge for Liquid Filtration Apparatus," and is for submission by the applicants with an amendment filed by them on or about November 28, 2001. I have spoken with the inventors about the facts and arguments set forth in such amendment.

4. Throughout my career I have dealt with liquid filtration media. I am experienced in the particular field of liquid filtration apparatus of the sort involving annular pleated filter cartridges and am aware of the nature and performance of annular pleated filter cartridges, including those existing before the invention of the above-noted Rose et al. patent application.

5. I have read the principal claim, amended claim 1, as set forth in the aforementioned amendment, which is as follows:

1. A pleated filter cartridge for removing particulates from liquid, the pleated filter cartridge being of the type including a perforate core, a pair of endcaps, and an annular non-woven filter element around the core formed by substantially axially-parallel pleats of at least one sheet of filter material, the filter element having opposite ends each in sealing engagement with one of the endcaps, characterized in that the filter material is a non-perforated non-woven material of flash-spun plexifilamentary high-density polyethylene fibrils, the filter material having a pressure drop of less than 4 psid at a flow rate of 10 gal/hr and a filtration efficiency of at least 98% of 1-2 micron particulates at a pressure differential of 30 psid.

6. I have read Patent No. 5,154,827 (Ashelin et al.) and am familiar with the DuPont pamphlet entitled "Dupont TYVEK -- The Medium That Fits a Variety of Filtration Needs," the references mentioned in the above-noted amendment.

- copy - for attachment to Mayer's Second Supplemental Declaration -

Ernest Mayer Declaration

Page 2 of 4

7. My review of the Ashelin et al. patent shows at least two key things which make that reference not at all pertinent to the invention set forth in the Rose et al. patent application.

8. First, the Ashelin et al. filter is a membrane or film filter and is designed for removal of particles of a *radically smaller size range* than the particles removed by Rose et al. invention. More specifically, the reference at column 1, line 13 of the Ashelin et al. patent to filtration of particles as small as "about 0.001 microns" and the indication at column 1, lines 12-16 of the patent that removal of contaminants of this extremely small size is "often required in the electronics and pharmaceutical industries" show clearly that the Ashelin et al. patent is dealing in a different realm; it is not related to annular pleated filter cartridges of the type having *non-woven* filters, which handle high-volume flows. The Ashelin et al. membrane filter is used for removing contaminant particles that are *three orders of magnitude less* than the smallest particles typically dealt with in annular pleated cartridges using non-wovens.

9. Second, while the claimed invention relates to an improvement in annular pleated filter cartridges of the *non-woven* filter type, the Ashelin et al. annular pleated filter cartridge uses what are referred to as *membranes* or *films* as its filtering material, and these are completely different from the subject of the Rose et al. invention. The Ashelin et al. patent membranes are microporous fluorocarbon film materials which have pores intended for capturing extremely tiny particles, and are far from the non-woven material of flash-spun plexifilamentary high-density polyethylene fibrils required in the annular pleated filter cartridges of the Rose et al. invention.

10. Annular pleated filter cartridges using microporous membranes or films are very different than annular pleated filter cartridges using non-wovens, and the Ashelin et al. patent has no bearing on particular problems such as those uniquely associated with annular pleated *non-woven* filter cartridges, which are in a separate category.

11. Another point emphasizing the non-pertinence of the Ashelin et al. filter material is the fact that it has, according to column 7, line 32, "three or more, e.g., up to as many as nine" sheets of filtration membrane in a lamination. Not only is this far more complex and expensive than applicants' claimed invention, but its very complexity emphasizes the non-pertinence of the Ashelin et al. patent. In contrast to the Ashelin et al. patent disclosure, applicants' claimed

- copy -

Ernest Mayer Declaration

Page 3 of 4

annular pleated filter cartridge has a non-woven filter material which does not require multiple layers and often is preferably used in a single layer.

12. Annular pleated non-woven filter cartridges are known to utilize *non-woven* filter materials, such as of polypropylene, nylon and various polyesters, that are significantly thicker and bulkier than the Tyvek material used in the unique annular pleated filter cartridges of the Rose et al. patent application. Until creation of the present invention there were no annular pleated liquid filtration cartridges utilizing Tyvek as the filtration medium.

13. Pleated annular filter cartridges of the type having non-wovens for filtration have particular problems and concerns relating to a difficulty of reliably achieving appropriate sealing of the pleated ends of a pleated non-woven with cartridge endcaps, as is absolutely essential in order to avoid by-pass of the filter. Based on my experience in the art, those skilled in the art of annular pleated non-woven filter cartridges would typically believe that the Tyvek non-woven material referred to in the Rose et al. patent application would not reliably achieve the end sealing relationship that is essential for annular pleated filter cartridges, and would thus turn to other thicker, bulkier non-woven materials. The Tyvek material is highly flexible, and to persons of ordinary skill in the art such thin flexible Tyvek material would not be considered appropriate for annular pleated filter cartridges.

14. The Tyvek material of the annular pleated filter cartridge of the Rose et al. patent application is very thin -- preferably less than about 0.15 mm thick and most preferably less than or equal to about 0.13 mm thick. Given such thinness and the nature of such material, the use of such fragile material for an annular pleated filter cartridge would be contra-indicated to a person of ordinary skill in the art because such material would not be thought reliably capable of successful lengthwise bonding (Tyvek-to-Tyvek) as necessary for formation of an annular pleated filter cartridge for liquid filter use.

15. Because of the particular nature of the Ashelin et al. patent, as noted above, persons of ordinary skill in the art would not combine the disclosure of such patent with knowledge of the Tyvek material in creation of an annular pleated filter cartridge.

- copy -

Ernest Mayer Declaration

Page 4 of 4

16. Nor would persons of ordinary skill in the art, who are aware of the nature of the problems typically associated with manufacture of annular pleated non-woven filter cartridges and made aware of characteristics of the Tyvek material, regard such Tyvek material as a material reasonably usable in connection with creation of an annular pleated non-woven filter cartridge.

17. More specifically, given the low firmness (high flexibility) of such filter material, and the material thinness which exacerbates such flexibility, the ability for such material to be formed successfully into an annular pleated filter cartridge was not and would not have been apparent to persons of ordinary skill in the art.

* * * * *

All statements made herein of my own knowledge are true, and all statements made on information and belief are believed to be true; such statements were made with the knowledge that willful false statements are punishable by fine or imprisonment or both (18 USC 1001) and jeopardize the validity of the application or any patent issued thereon.

Dr. Ernest Mayer
Ernest Mayer, Ph.D.

Dated: November 28, 2001

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